R. F. Sognnaes, Professor of Oral Biology at the University of California, Los Angeles, introduced the morning session with an historical review of fluoridation of drinking water. He reminded the audience that 1977 was the 60th anniversary of the reports of mottled enamel by F.S. McKay which subsequently, in 1931, was shown to be caused by fluoride in drinking water. As a result of the discovery of the cariostatic property of fluoride, it is estimated that some 105,800,000 people in the United States are now drinking fluoridated water. Sognnaes pointed to the advantages of fluoridating water in schools, a measure first introduced in the city of Elkwood, Pennsylvania, which may serve as a substitute for municipal water fluoridation. He also suggested that, in non-fluoridated communities, tea with added lemon juice might be a suitable source of fluoride intake. He considers fish, "the richest source of fluoride in food", which can provide an increase in fluoride uptake.

The paper by D.R. Taves of Rochester, New York, concentrated on two subjects namely, the uptake of fluoride through food and homeostasis of fluoride in the bloodstream. He stated that fluoride assays by the ion specific electrode which he used for fluoride analysis did not yield as high fluoride levels as the direct colormetric method used by Spencer for the kind of foods which she analyzed. He confirmed her observation that chicken contains a relatively high amount of fluoride (of the order of 5 ppm) but for most other common foods his values were significantly lower than those she obtained. On the question of homeostasis of fluoride in the blood stream, Taves' conclusions disagreed with those of Singer and Armstrong. His results indicated a passive diffusion of fluoride rather than homeostasis.

W.S. Guy of Children's Hospital, Cincinnati, Ohio, stressed the need for differentiating between inorganic and organic fluoride in human plasma. In conjunction with Taves, he had isolated in 1976 by spectroscopic analysis, perfluorooctanoic acid, a major component in pooled plasma which accounts for at least 1/3 of the total organic fluoride content. This compound reaches the blood stream from the use of such products as floor waxes, wax paper, Scotch Guard, and other items. Along with Taves, Guy suggested that fluoride determinations by methods of Armstrong and Singer are inaccurate and that the blood levels of fluoride correlate much more closely with fluoride levels in drinking water than has been previously reported. The levels of organic fluoride, however, were not related to the content of inorganic fluoride in drinking water. He suggested that in infants fluoride supplements amounting to 1/2 mg daily are excessive. He also discussed the fetoplacental barrier for fluorides.

T.M. Marthaler of the University of Zurich, Switzerland, reviewed the fluoridation studies carried out in the USA during the 40's and 50's in Kingston-Newburgh, Grand Rapids, Brantford-Sarnia, and Evanston-Oak Park in support of the hypothesis that fluoridation reduces tooth decay by 2/3. He

don, 1969, p. 481. 16. Phaneuf, R., Consultant, Mercury Studies Program, National Indian Brotherhood, Ottawa, July, 1976. 17. Mayhall, J.T.: Dental Caries and Nutrition. Nutrition of Indian and Eskimo Children, Ross Laboratory, Montreal, 1975, p. 155. 18. Marier, J. and Rose, D.: The Fluoride Content of some Foods and Beverages-a Brief Survey Using a Modified Zr-SPADNS Method. J. Food Science, 31:941-6, 1966. 19. Farkas, C.S.: Water Fluoridation, the Human Diet and the Environment. Society to Overcome Pollution, Montreal, 1973. 20. Government of Canada, Food and Drug Regulations 1970 #B 150001, p. 65. 21. Suttie, J. and Phillips, P.: Fluoride Ingestion and Vitamin Metabolism. In Fluorine and Dental Health: The Pharmacology and Toxicology of Fluorine, Muhler, J.C.; Indiana Press, 1959, p. 70. 22. Pass, C.: Report of Preliminary Diet Survey of Cree Population. Medical Services, Health and Welfare, Canada, Jan. 1976. 23. Nutrition Canada, Health and Welfare, Ottawa Indian Survey, 1975. 24. Farkas, C.S.: Consideration of Potential Magnesium Deficiency Among Northern Indians of Eastern Canada. J. Cnd. Diet. Ass., 38:57, 1977. 25. Lee, M., Reyburn, R., Carrow, A.: Nutritional Status of British Columbia Indians. Cnd. J. Publ. Hlth., 62:285-296, 1971. 26. Manning, P.J.: The Nutritional Basis of Otitis Media. Op. Cit., Ross Labs, 1975, p. 151. 27. Farkas, C.S.: Components of Northern Canadian Indian Diet and Mercury Toxicity; with Special Attention Paid to Thiamin, Magnesium, and Fluoride. Manuscript, National Indian Brotherhood, June, 1976.

SPECIAL REPORT

AAAS FLUORIDE SYMPOSIUM IN DENVER

by

G.L. Waldbott and J. Yiamouyiannis
Warren, Michigan and Delaware, Ohio.

At its annual Conference on February 25, 1977, the American Association for the Advancement of Science held a symposium in Denver, Colorado, entitled, "Continuing Evaluation of the Use of Fluoride". The morning session was devoted to the metabolic and dental aspects of fluoride. In the afternoon the question of safety was examined which, as expressed in the program, "has received considerable attention by the academic community over the years, but has often not entered adequately into the considerations of the clinician". This part of the session was intended to consider "some special cases which represent potential risks if the problems are not recognized by the clinician or investigator involved".

they are not patentable drug manufacturers have not requested FDA's approval for them.

G.M. Whitford of the Medical College of Georgia showed that, in anesthetized rats, renal clearance of fluoride is determined by the urinary pH, not by the flow rate of the urine nor by the amount of potassium excreted, as formerly believed. Reabsorption of urine in the renal tubules is inversely related to the pH of the tubular fluid. Whitford also found that fluoride is absorbed by the bladder, probably as HF. This process too is inversely related to the pH of the urine. At pH 1.85, 70% of radioactive fluoride was absorbed but only 5% at pH 5.5.

W.J. Johnson of the Mayo Clinic discussed the effect of fluoridated water in hemodialysis. In 7 nephritic patients with skeletal changes (5 of whom had dental fluorosis as well) from natural fluoride areas in the USA, hemodialysis with fluoridated water aggravated the kidney disease and led to spontaneous fractures. Fluoride-containing water increased the fluoride concentration in the blood by 10 to 20 micromoles/liter, or by 0.19 to 0.38 ppm. Johnson also showed that patients with renal failure retain more fluoride.

R.A. VanDyke of the Mayo Clinic discussed the biotransformation of fluoride-containing anesthetics in the body. In the complete absence of oxygen, halothane is known to cause renal failure. The loss of fluoride ions from these anesthetics accounts for the damage to kidneys.

The final paper by Suttie of the University of Wisconsin at Madison dealt with the effect of fluoride on cultured cells. Fluoride at 10 ppm inhibited growth of cell cultures (L Cells). By selection and cloning, Suttie was able to increase cell resistance to fluoride after previous exposure. He theorized that fluoride-resistant cells may be able to pump out the fluoride which has entered into them. He was also able to show metabolic distortions in cells at fluoride levels which did not affect the growth rate of his cells, the most significant of which was the depletion of DPN (or NAD), the biologically active form of niacinamide.

The discussion that followed the afternoon program revolved around the current controversy concerning the possible relationship between fluoridated water and cancer. This subject receives further attention on page 102 in this issue.

pointed out that regular intake of fluoride tablets accounts for fluoride uptake in the tooth which is comparable to that from fluoridation of water. In dentin, considerably more fluoride accumulates than in deep enamel.

E. Johansen of the University of Rochester, N.Y., School of Medicine and Dentistry, presented a paper on the effect of dental hygiene combined with local application of a fluoride-containing dentifrice in patients who had been treated for cancer by irradiation to the point that their salivary glands were no longer functional. As a result of the lack of saliva flow (plus other possible unknown factors) the teeth would normally undergo severe degradation. He treated these patients with intensive dental care, a mineral mouthwash, removal of food debris, topical self-application of fluoride at 20,000 ppm, and special fluoride-containing chewing gum. This treatment retarded the deterioration of teeth. In individuals aged 6 to 80 years he virtually eliminated caries by these measures. He pointed out that caries develops at the interior layer of the enamel and that much fluoride applied topically is lost after 24 hours.

In the discussion, H.C. Hodge of the University of California School of Medicine, San Francisco, emphasized that the consumption of fluoridated water by newborn infants is potentially harmful because they might develop dental fluorosis. Furthermore, in fluoridated communities no supplementary fluoride (tablets or drops) should be administered because of the narrow margin of safety of fluoride. In the discussion, the following possible sources of an overdose were noted: 1) infant formulas made with fluoridated water; 2) baby food, especially those containing chicken; 3) infant formulas reconstituted with fluoridated water; 4) swallowing of fluoridated toothpaste and 5) excessively high doses of fluoride (5 to 7 ppm) which are supplied in drinking fountains in schools. One participant suggested that the Dental Section of the AAAS should alert the American Medical Association and American Association of Pediatrics to the concern of the Section, but no action to this effect was taken.

The afternoon session opened with an outstanding paper by J.O. Jowsey of the Mayo Clinic, Rochester, Minnesota. She pointed out that osteoporosis is becoming more and more prevalent and is attacking people at a young age. Adequate exercise and adequate calcium intake in the diet can prevent osteoporosis but after the disease begins it is difficult to cure. Osteoporotic patients cannot exercise—one of the means of preventing osteoporosis—and the more severe the disease the less beneficial are calcium supplements. At this stage, administration of fluoride alone worsens the condition of the osteoporotic patient but when taken together with large amounts of calcium, Jowsey reported a therapeutically ameliorative effect on the osteoporotic patient. Calcium carbonate-sodium fluoride tablets, according to Jowsey, have not been approved by the Food and Drug Administration; because

"ATTORNEY-CLIENT PRIVILEGED INFORMATION"

September 19, 1991

To: Walt Stewart
From: Terry Vandell

Subject: Meeting Minutes Of The On-Site Washington Works Meeting (September 11, 1991, 9:00 AM-11:00 AM) Regarding The September 4, 1991 Proposed C-8 Sampling Program

Present: John Doughty, Tony Eichstadt, Wendell Goin, Penny Mahoney, Mike McClusky, Carl Musca, Dave Ramsey, Walt Stewart, Terry Vandell

- Introduction: Walt Stewart, See Attachment 1

- Chemical Data Results: Penny Mahoney, See Attachment 2

Key Points: Appendix IX constituent levels and presence are inconsistent under the site, whereas the C-8 presence and levels are much more consistent; C-8 found at low ppb level on-site in wells TW27 & TMW4, but at much higher levels in wells TW32 and TW33 which are closer to the old supernate ponds (the exact quantitative results from wells 32 & 33 are still pending but are believed to be > 1 ppm).

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Key Points: In 1984 C-8 found <1.5 ppb .25 to 3 miles downgradient from Washington Works. No C-8 found 12+ miles downstream. C-8 concentration trends on-site at well TW 27 difficult to analyze due to change in analytical technique. However, data do not indicate large increases in C-8 concentration since 1987, (from 2.0 to 5.9 ppb). Off-site water samples from home taps (i.e. from the existing Lubeck wellfield) indicate C-8 from .7 to 3.9 ppb, with the 3.9 ppb measured from a sample taken on 8/8/91. C-8 was detected in a new well in the new Lubeck wellfield (2.7 miles south-southwest of Washington Works), at 2.4 ppb on 6/23/91. No C-8 was found in nearby private water wells, however.

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Key Point: CH2M Hill has been authorized to develop a C-8 detection analytical technique to 0.1 ppb.

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The purpose in conducting the proposed extensive C-8 sampling program is to "verify or dismiss" the presence of C-8 in the new Lubeck Wellfield, and to obtain sufficient river water quality data to address the question of whether the river serves as a transport mechanism for C-8. Such an evaluation of the potential transport mechanisms (by the ground water or river) was discussed and agreed to at the August 14, 1991 meeting in Wilmington (called by Mike Deak).

DUPONT 000515

The September 4, 1991 proposed C-8 sampling plan was altered as a result of the September 11, 1991 meeting. The following changes were made:

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3. The revised Sept. 4, 1991 sampling plan is included as Attachment 5.

NOTE: Sampling was conducted and completed on 9/11,12 & 13th/91by Jim Yoak, Penny Mahoney, Nina Mazdai, Terry Vandell (of DuPont), with assistance from Bill Packard (Lubeck City). All samples were collected on 9/11 and 9/12 and shipped out on 9/12/91, with the exception of well TWM4, which was sampled on 9/13/91, with the sample shipped on 9/13/91.

Limited Distribution Only To:

Jim Allen
Mike Deak
Wendell Goin
Carl Musca

DT:0002316

ATTACHMENT 1 WALT STEWART

DU PONT CONFIDENTIAL
ATTORNEY/CLIENT COMMUNICATION

AIM

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3)	Historical Data • Off-site Sampling • Current Test Results	McClusky
4)	Test Development • Limits and Guidelines • Experimental Station • CH_2M Hill	McClusky
5)	Proposed Sampling Plan • Hydrogeologic Data - Plant - Off-site • Sampling Locations	Vandell

DE:000247

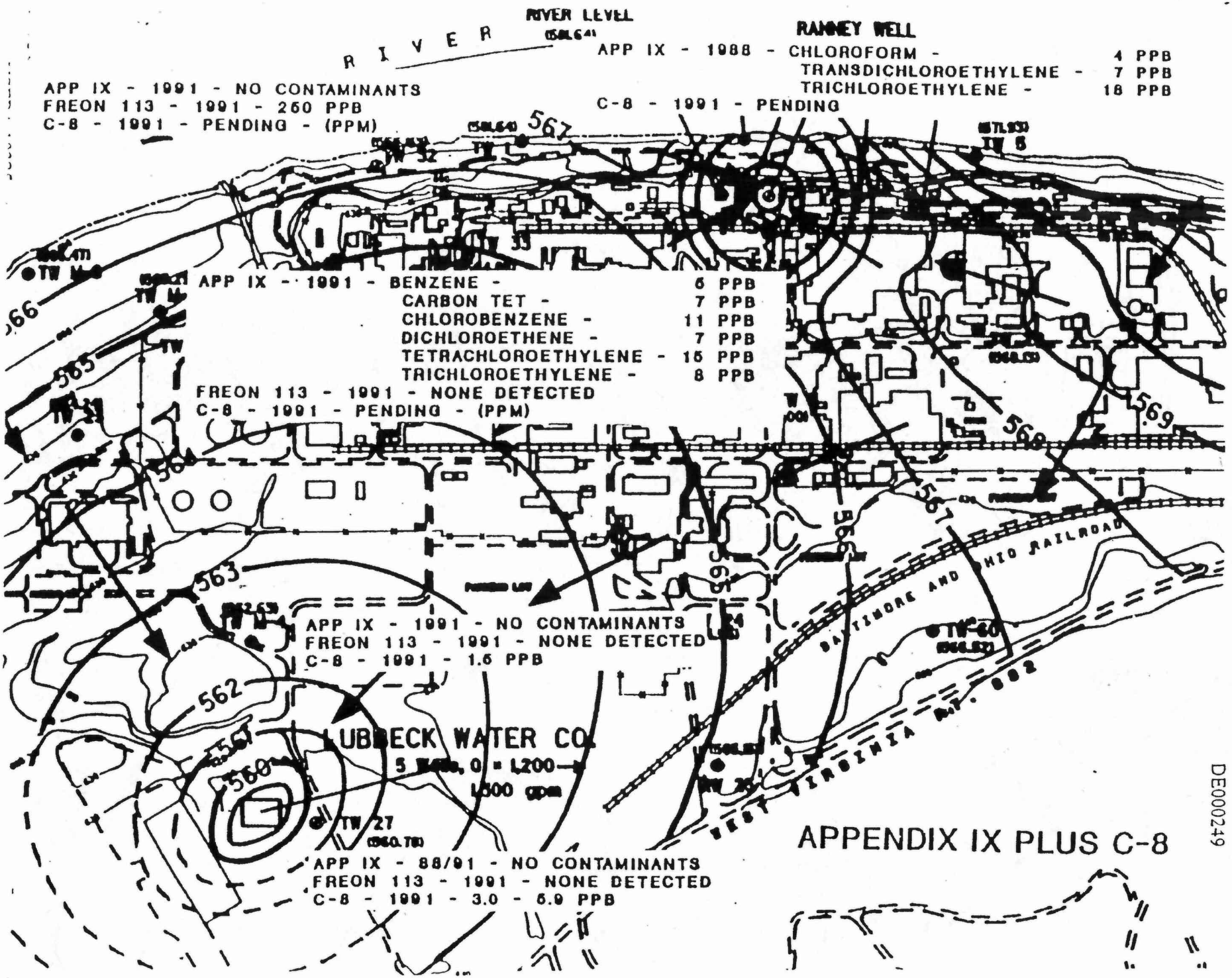
ATTACHMENT 2 PENNY MAHONEY

C-8 BACKGROUND INFORMATION

- GROUNDWATER FLOW REVIEW
- OVERVIEW OF HISTORICAL CHEMICAL ANALYSIS
- RECENT CHEMICAL ANALYSIS
- NEW LUBECK WELL RESULTS

USEPA 10324

DE000248


RIVER LEVEL
RIVER
APP IX - 1991 - NO CONTAMINANTS
FREON 113 - 1991 - 260 PPB
C-8 - 1991 - PENDING - (PPM)
RANNEY WELL
APP IX - 1988 - CHLOROFORM - 4 PPB
TRANSDICHLOROETHYLENE - 7 PPB
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FREON 113 - 1991 - NONE DETECTED
C-8 - 1991 - PENDING - (PPM)
APP IX - 1991 - NO CONTAMINANTS
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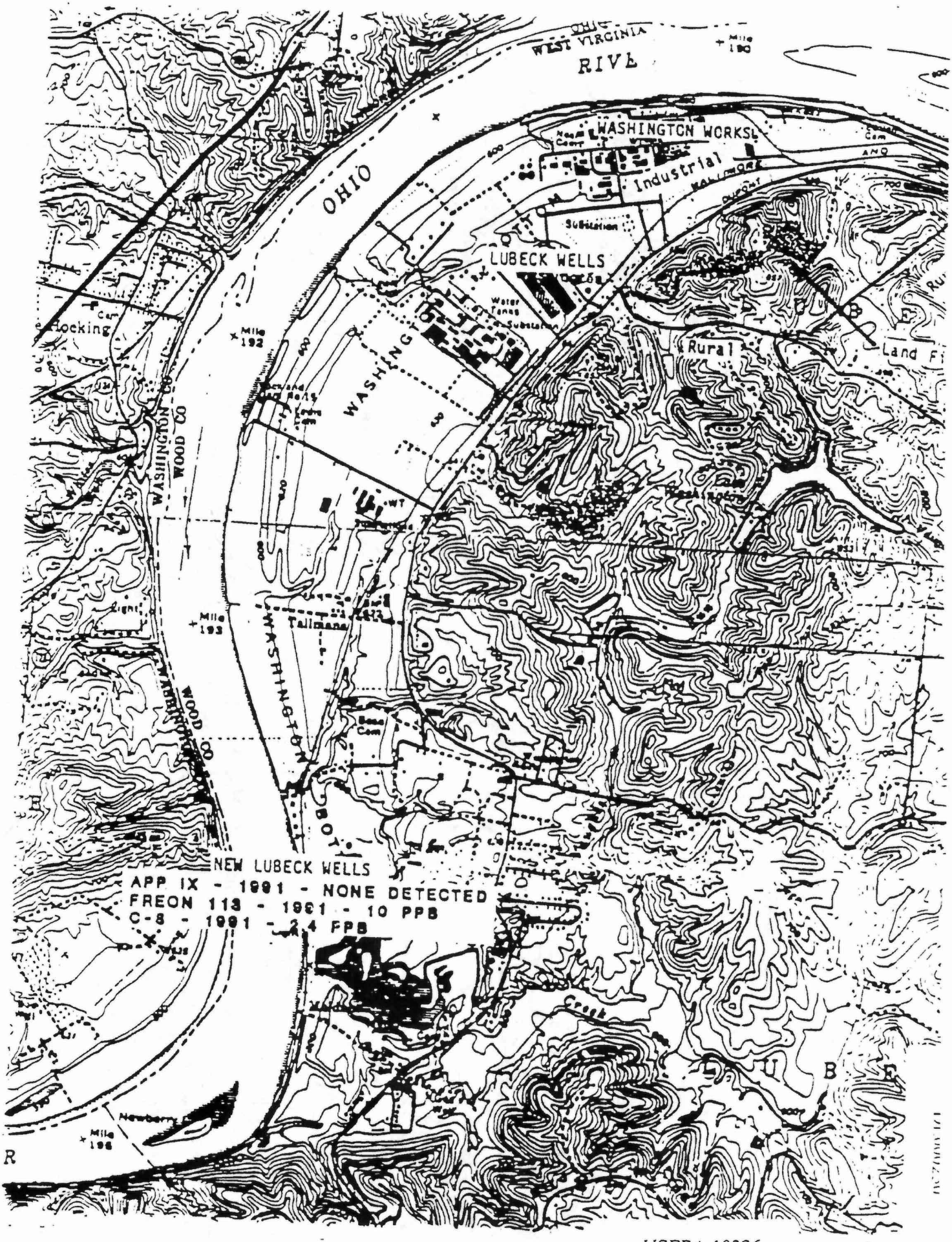
C-8 - 1991 - 1.6 PPB
LUBBECK WATER CO.
APP IX - 88/91 - NO CONTAMINANTS
FREON 113 - 1991 - NONE DETECTED
C-8 - 1991 - 3.0 - 6.9 PPB
BALTIMORE AND OHIO RAILROAD
WEST VIRGINIA RT. 892
APPENDIX IX PLUS C-8
DE000249


WEST VIRGINIA
RIVE
OHIO
WASHINGTON WORKS
Industrial
Subdivision
LUBECK WELLS
Water Tower Substation
Rural
Land F
Hocking
WASHINGTON
WOOD CO
Mile 192
Mile 193
Tallmans
Mile 194
NEW LUBECK WELLS
APP IX - 1991 - NONE DETECTED
FREON 113 - 1991 - 10 PPB
C-8 - 1991 - 2.4 PPB
Creek
Newberry

USEPA 10326

ATTACHMENT 3 MIKE MCCKLUSKY

C-8 SAMPLING (MARCH - JUNE 1984)

LOCATION	DISTANCE (MILES)	C-8 PPB (0.6 LIMIT)
PKSBG-HOME TAP	7.5 UPSTREAM	<
WW-DRINK FTN	---	<
DIST. CTR-WELL	0.25 DOWN	<
WASHINGTON-STORE TAP	0.25 DOWN	1.2,1.0
LUBECK-STORE TAP	0.25 DOWN	1.5
L. HOCKING-STORE TAP	3 DOWN	0.8,0.6
BELLEVILLE-PRIVATE WELL	12 DOWN	<
REEDSVILLE-STORE TAP	14 DOWN	<
RAVENSWOOD-STORE TAP	29 DOWN	<
RACINE-STORE TAP	50 DOWN	<
POINT PLEASANT-STORE TAP	74 DOWN	<
GALLIPOLIS-STORE TAP(*)	79 DOWN	<

(*) NEAREST COMMUNITY TO TAKE WATER DIRECTLY FROM OHIO RIVER.

DW-0000351

C-8 ON SITE SAMPLING

TEST WELL #27	C-8 PPB	
6/ 4/87	2.0	
5/11/88	1.5	
11/ 4/88	1.3	
5/ 4/89	<0.6	
8/ 1/89	1.3	
10/24/89	1.5	
2/27/90	1.5	
4/20/90	1.5	
7/13/90	1.6	
8/ 9/90	<10	(3.0)
10/19/90	<10	(3.0)

REVISED TEST Tw 27

1/15/91	2.9	increase may be from revised test
4/18/91	3.0	
7/24/91	5.9	
8/ 2/91	5.0	

ADJACENT WELL: MW-4

5/13/91	1.5
8/ 1/91	1.4

WW DRINKING WATER

3/13/87	BLDG 3	<0.6
11/ 2/88	BLDG 212	<0.6
5/12/89	BLDG 212	<0.6
5/ 8/89	BLDG 212	<0.6

* Dave Ramsey – suggest sampling W331 in East Well Field for C-8 analysis

DI:0002252

C-8 OFF SITE SAMPLING

		C-8 PPB
3/13/87	LUBECK BUSINESS TAP (2)	1.9, 1.9
5/12/88	LPSD HOME TAP -P	2.2
11/ 2/88	LPSD HOME TAP -P	1.4
5/ 7/89	LPSD HOME TAP -P	0.7
5/23/91	LPSD HOME TAP -M	3.8
5/29/91	LPSD HOME TAP -C	3.8
8/ 8/91	LPSD HOME TAP -M	3.9

****

3/13/87	VIENNA HOME TAP -M	<0.6
3/13/87	LITTLE HOCKING BUSINESS TAP	<0.6
5/12/88	LITTLE HOCKING HOME TAP -R	<0.6

****

11/28/90	LUBECK PRIVATE WELLS (2) > near new Lubeck well field	<0.6, <0.6
8/ 9/91	LUBECK PRIVATE WELLS (2) > near new Lubeck well field	<1.0, <1.0

****

6/23/91	NEW LUBECK WELL	2.4 (★)

(★) CH2MHILL CONFIRMED "PRESENCE" OF C-8

DH:000252

USEPA 10220

ATTACHMENT 4 MIKE MCCKLUSKY

C-8 HUMAN EXPOSURE

LIMITS	uG/M3
TLV (3M)	100
AEL (DUPONT)	10
CEG (AIR, WATER)	

HASKELL ESTABLISHED: 8 uG C-8 PER 24 HOURS

80% BY AIR ..... 6.4 uG/ 20M3 = 0.32 OR 0.3 uG/M3

20% BY WATER ..... 1.6 uG/ 2 L = 0.80 OR 1 PPB

8.0 ug

OUTSIDE CONTRACT LAB: CH2MHILL

$23M AUTH TO PROVIDE 0.1 PPB C-8 IN WATER ANALYSIS

PS2000.101

ATTACHMENT 5 TERRY VANDELL

1.HYDROGEOLOGY :

SAND & GRAVEL AQUIFER, ON-SITE 65-100 FT DEEP; OFF-SITE AT NEW LUBECK WELLFILED, 15-65 FT DEEP, YIELDS OF SEVERAL HUNDRED GPM. WELLS DRILLED VIA CABLE TOOL RIG,DEVELOPED @ SEVERAL HUNDRED GPM, 6 TO 32 HRS EACH.

2. C-8 TIME OF TRAVEL IN GW:

ON-SITE, TO LUBECK WELLS, 5 YRS.

OFF-SITE TO NEW LUBECK WELLS, 49-117 YRS.

3. PERCENTAGE OF C-8 IN OHIO RIVER:

20,000 LBS/YR C-8/ ~~10~~ 20,000 CFS = .000634 LBS/SEC / 623607 LBS/SEC = .000000001, OR 1 PPB

4. C-8 & FREON 113 SAMPLING PLAN: REQUIRED BY MIKE DEAK, CORPORATE SHEA MANAGER (AUGUST 14, 1991), TO RESAMPLE NEW LUBECK WELLS, OLD LUBECK WELLS, & RIVER WATERS. PURPOSE: TO "VERIFY" THE PRESENCE, EXTENT AND PATH /OR THE ABSENCE, OF C-8 OFF-SITE, "ASAP".

DE000255

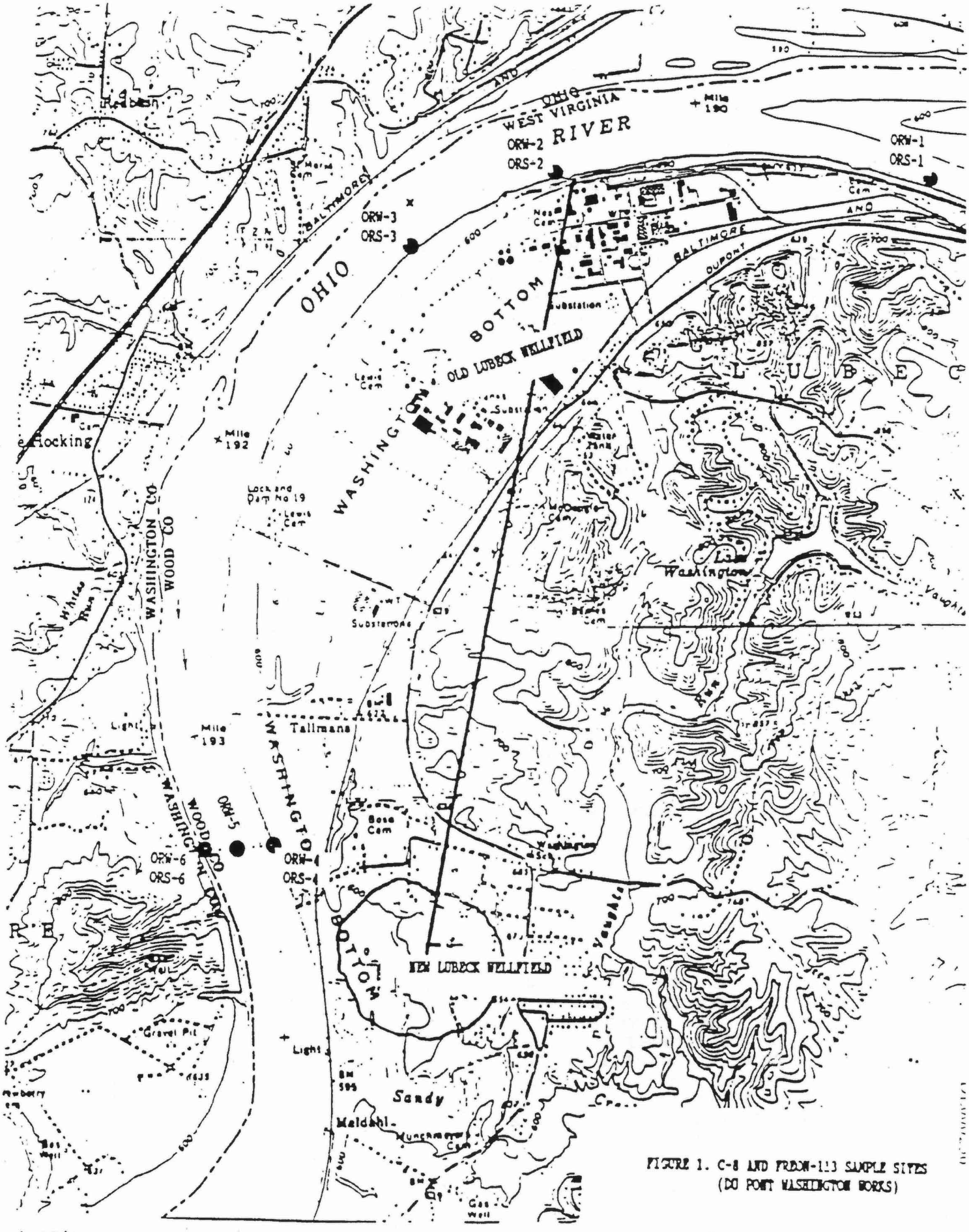


FIGURE 1. C-8 AND FRDW-113 SAMPLE SITES
(DU PONT WASHINGTON WORKS)

USEPA 10332

"ATTORNEY-CLIENT PRIVILEGED INFORMATION"

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9F3000.101

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DE0002247

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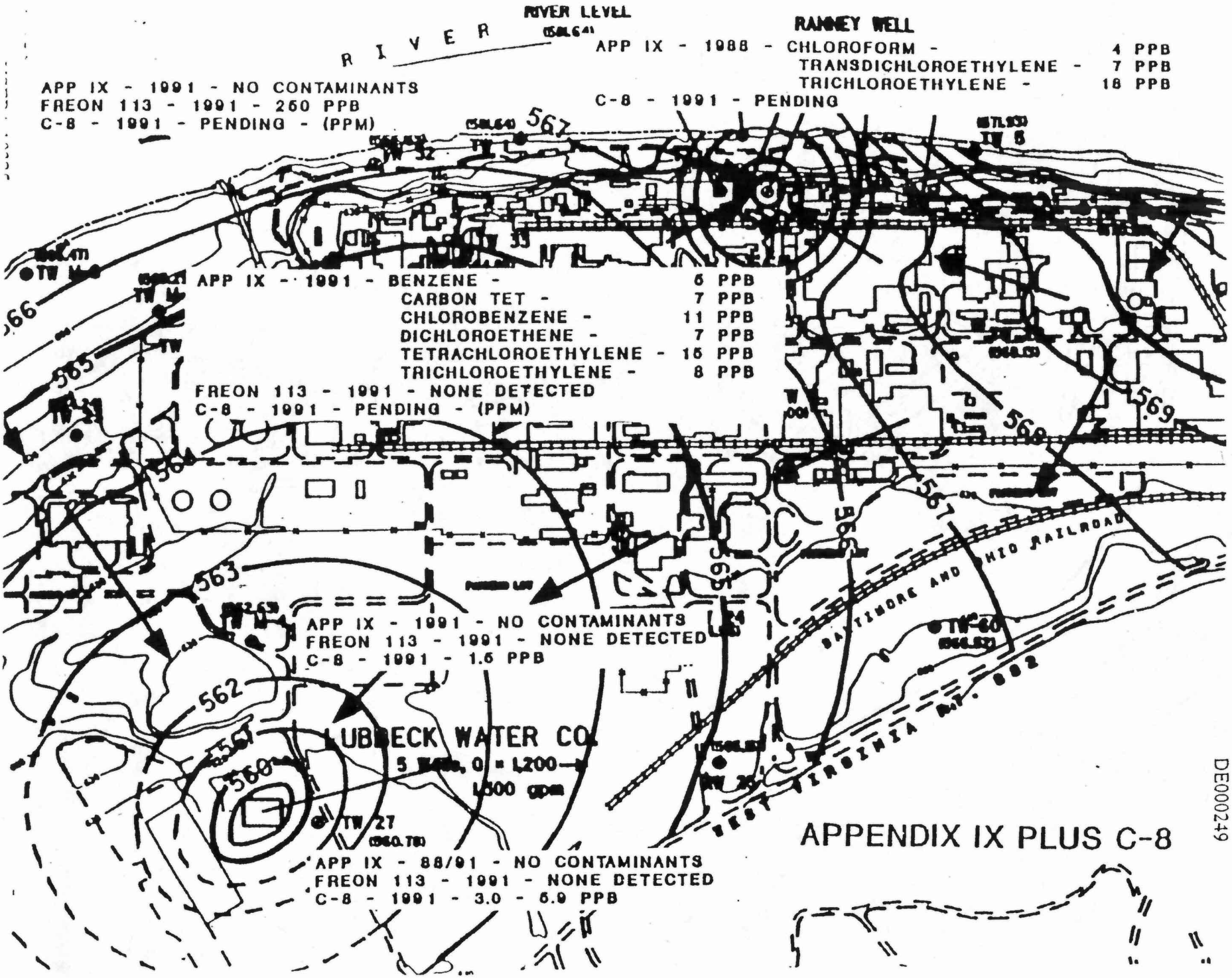
- NEW LUBECK WELL RESULTS

USEPA 10324

DE000248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RAMSEY WELL
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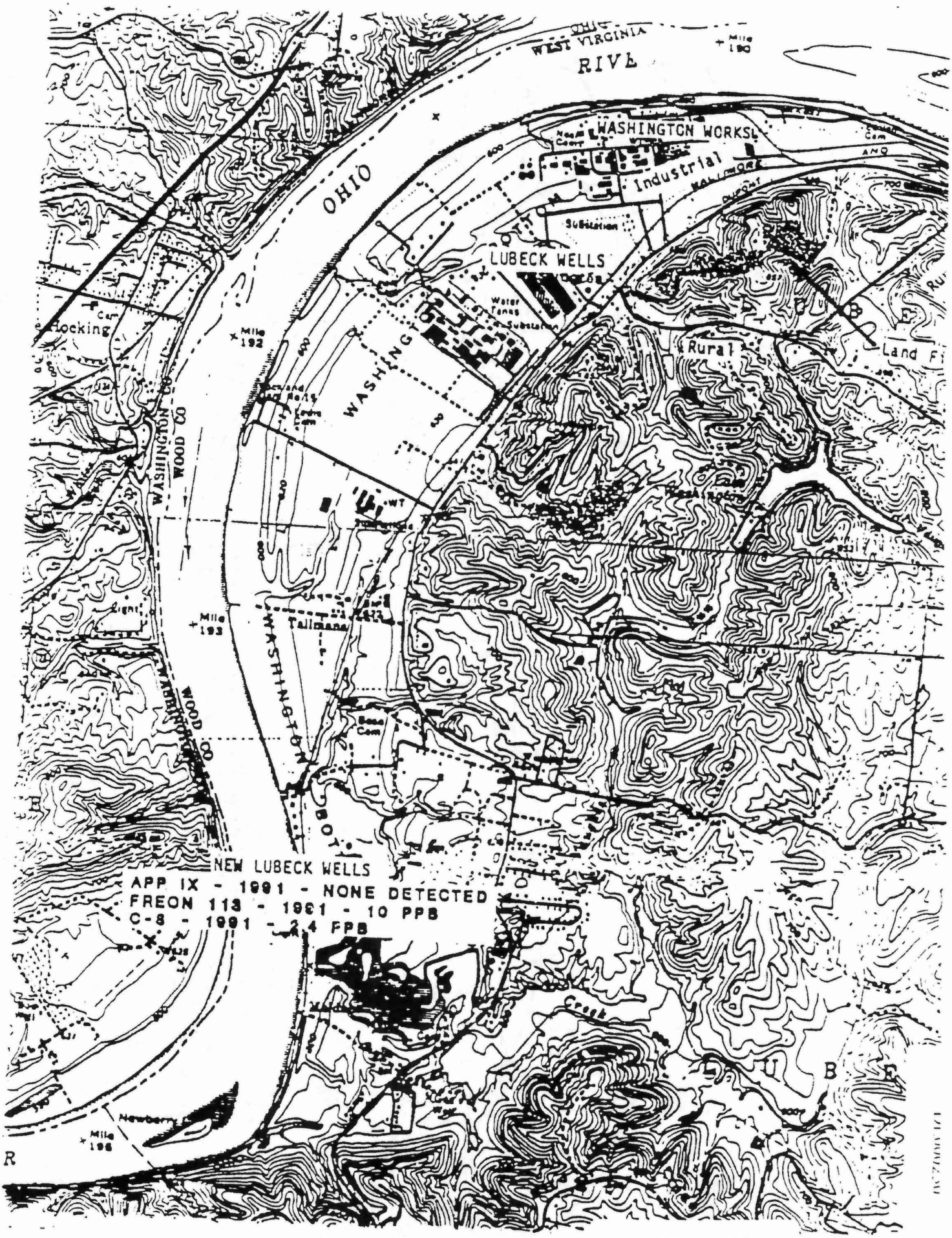
C-8 - 1991 - 1.5 PPB
LUBBECK WATER CO.
APP IX - 88/91 - NO CONTAMINANTS
FREON 113 - 1991 - NONE DETECTED
C-8 - 1991 - 3.0 - 5.9 PPB
BALTIMORE AND OHIO RAILROAD
WEST VIRGINIA
APPENDIX IX PLUS C-8
DE000249


WEST VIRGINIA
RIVE
OHIO
WASHINGTON WORKS
Industrial
Substation
LUBECK WELLS
Water Tower Substation
Rural
Land Fi
Docking
WASHINGTON
WOOD CO
Mile 192
Mile 193
Tallmans
Mile 196
NEW LUBECK WELLS
APP IX - 1991 - NONE DETECTED
FREON 113 - 1991 - 10 PPB
C-8 - 1991 - 24 PPB
Creek
L U B E

USEPA 10326

ATTACHMENT 3 MIKE MCCKLUSKY

C-8 SAMPLING (MARCH - JUNE 1984)

LOCATION	DISTANCE (MILES)	C-8 PPB (0.6 LIMIT)
PKSBG-HOME TAP	7.5 UPSTREAM	<
WW-DRINK FTN	---	<
DIST. CTR-WELL	0.25 DOWN	<
WASHINGTON-STORE TAP	0.25 DOWN	1.2,1.0
LUBECK-STORE TAP	0.25 DOWN	1.5
L. HOCKING-STORE TAP	3 DOWN	0.8,0.6
BELLEVILLE-PRIVATE WELL	12 DOWN	<
REEDSVILLE-STORE TAP	14 DOWN	<
RAVENSWOOD-STORE TAP	29 DOWN	<
RACINE-STORE TAP	50 DOWN	<
POINT PLEASANT-STORE TAP	74 DOWN	<
GALLIPOLIS-STORE TAP(*)	79 DOWN	<

(*) NEAREST COMMUNITY TO TAKE WATER DIRECTLY FROM OHIO RIVER.

DW-0002351

C-8 ON SITE SAMPLING

TEST WELL #27	C-8 PPB	
6/ 4/87	2.0	
5/11/88	1.5	
11/ 4/88	1.3	
5/ 4/89	<0.6	
8/ 1/89	1.3	
10/24/89	1.5	
2/27/90	1.5	
4/20/90	1.5	
7/13/90	1.6	
8/ 9/90	<10	(3.0)
10/19/90	<10	(3.0)

REVISED TEST Tw 27

1/15/91	2.9	increase may be from revised test
4/18/91	3.0	
7/24/91	5.9	
8/ 2/91	5.0	

ADJACENT WELL: MW-4

5/13/91	1.5
8/ 1/91	1.4

WW DRINKING WATER

3/13/87	BLDG 3	<0.6
11/ 2/88	BLDG 212	<0.6
5/12/89	BLDG 212	<0.6
5/ 8/89	BLDG 212	<0.6

* Dave Ramsey – suggest sampling W331 in East Well Field for C-8 analysis

DW00252

C-8 OFF SITE SAMPLING

		C-8 PPB
3/13/87	LUBECK BUSINESS TAP (2)	1.9, 1.9
5/12/88	LPSD HOME TAP -P	2.2
11/ 2/88	LPSD HOME TAP -P	1.4
5/ 7/89	LPSD HOME TAP -P	0.7
5/23/91	LPSD HOME TAP -M	3.8
5/29/91	LPSD HOME TAP -C	3.8
8/ 8/91	LPSD HOME TAP -M	3.9

****

3/13/87	VIENNA HOME TAP -M	<0.6
3/13/87	LITTLE HOCKING BUSINESS TAP	<0.6
5/12/88	LITTLE HOCKING HOME TAP -R	<0.6

****

11/28/90	LUBECK PRIVATE WELLS (2) > near new Lubeck well field	<0.6, <0.6
8/ 9/91	LUBECK PRIVATE WELLS (2) > near new Lubeck well field	<1.0, <1.0

****

6/23/91	NEW LUBECK WELL	2.4 (★)

(★) CH2MHILL CONFIRMED "PRESENCE" OF C-8

DW 00023

ATTACHMENT 4 MIKE MCCKLUSKY

C-8 HUMAN EXPOSURE

LIMITS	uG/M3
TLV (3M)	100
AEL (DUPONT)	10
CEG (AIR, WATER)	

HASKELL ESTABLISHED: 8 uG C-8 PER 24 HOURS

80% BY AIR ..... 6.4 uG/ 20M3 = 0.32 OR 0.3 uG/M3

20% BY WATER ..... 1.6 uG/ 2 L = 0.80 OR 1 PPB

8.0 ~g

OUTSIDE CONTRACT LAB: CH2MHILL

$23M AUTH TO PROVIDE 0.1 PPB C-8 IN WATER ANALYSIS

DT00054

ATTACHMENT 5 TERRY VANDELL

1. HYDROGEOLOGY :

SAND & GRAVEL AQUIFER, ON-SITE 65-100 FT DEEP; OFF-SITE AT NEW LUBECK WELLFILED, 15-65 FT DEEP, YIELDS OF SEVERAL HUNDRED GPM. WELLS DRILLED VIA CABLE TOOL RIG, DEVELOPED @ SEVERAL HUNDRED GPM, 6 TO 32 HRS EACH.

2. C-8 TIME OF TRAVEL IN GW:

ON-SITE, TO LUBECK WELLS, 5 YRS.

OFF-SITE TO NEW LUBECK WELLS, 49-117 YRS.

3. PERCENTAGE OF C-8 IN OHIO RIVER:

20,000 LBS/YR C-8/ ~~10~~ 20,000 CFS = .000634 LBS/SEC / 623607 LBS/SEC = .000000001, OR 1 PPB

4. C-8 & FREON 113 SAMPLING PLAN: REQUIRED BY MIKE DEAK, CORPORATE SHEA MANAGER (AUGUST 14, 1991), TO RESAMPLE NEW LUBECK WELLS, OLD LUBECK WELLS, & RIVER WATERS. PURPOSE: TO "VERIFY" THE PRESENCE, EXTENT AND PATH /OR THE ABSENCE, OF C-8 OFF-SITE, "ASAP".

DE:000255

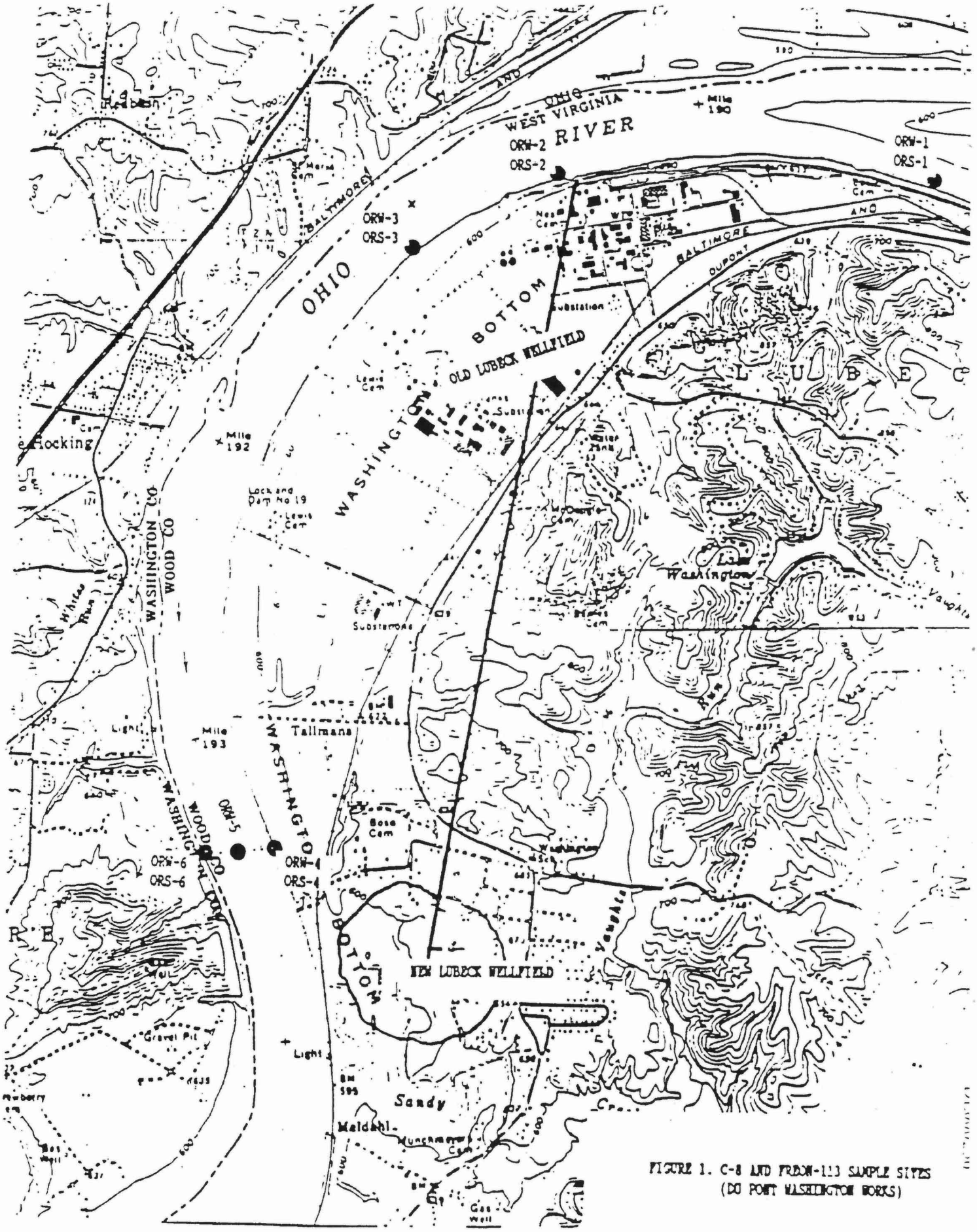


FIGURE 1. C-8 AND FRDW-113 SAMPLE SITES
(DU PONT WASHINGTON WORKS)

3. However, community populations are not equivalent to worker populations. Therefore, factor in a 10X reduction - 5 ppb (concentration in water).

This doesn't take into account the time factor (worker exposed 8 hours, not-exposed 16 hours, etc. whereas drinking water intake could be anytime during 16 hours, off 8 hours, etc.). However, the long half-life of this chemical in the blood might make this consideration less important.

I hope that these suggested guidelines will be useful. Please call if you have any questions.

GLK:ms

RJ7005409

EID078780

CENTRAL RESEARCH AND DEVELOPMENT DEPARTMENT
HASKELL LABORATORY FOR TOXICOLOGY
AND INDUSTRIAL MEDICINE

cc: J. B. Armitage-
PPD, M-5622
W. L. Sprout

June 25, 1987

TO: H. A. SMITH
PPD
M-5625

FROM: G. L. KENNEDY, JR.

AMMONIUM PERFLUOROOCTANOATE
(Ref.: Letter HAS-GLK, 6/12/87

An acceptable level for ammonium perfluorooctanoate (C-8) in the blood of workers would be 0.5 ppm. This value has been calculated using the average daily C-8 accumulation rate observed in new employees who were exposed to airborne concentrations of 0.008 mg/m^3 (memo, J. G. Loschiavo to R. J. Zipfel, 7/29/82). From this data, a steady-state concentration of 0.5 ppm, which represents the dynamics of exposure and elimination, was estimated (Memo, T. P. Pastoor to J. G. Loschiavo, 8/25/82). These estimates appear consistent with most of the reported human data but the data base is not too extensive. In addition, in rat inhalation experiments, no signs of toxicity were detected following exposure to 1 mg/m^3, an atmospheric concentration corresponding to a blood level in the male rat of 10 ppm. Extrapolation of the data relating the concentration of C-8 in the air to blood levels in the rat suggests that inhalation of 0.01 mg/m^3 would result in blood level of approximately 1 ppm (equation is blood level = 12 $\sqrt{\text{air concentration}}$).

An acceptable level for community drinking water would be 5 ppb. This value has been arrived at as follows:

1. The AEL (8-hr TWA) is 0.01 mg/m^3; a worker breathing 10m^3/day would take in 0.1 mg. Assume 100% absorption.

2. Daily ingestion by man of 2 L of water/day: 0.1 mg/2L (assume 100% absorption) = 50 ppb (a concentration in water).

RJ7005408

EID078779

Z-48 REV. 3/81

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

POLYMER PRODUCTS DEPARTMENT

CC: R. J. ZIPFEL, WASHINGTON WORKS
J. B. ARMITAGE
W. L. SPROUT, CR&D
D. G. WIKA

June 12, 1987

G. L. KENNEDY
CR&D DEPARTMENT
HASKELL LAB

AMMONIUM PERFLUOROOCTANOATE (C-8)

Please establish an acceptable level for C-8 in blood, and an acceptable level for C-8 in community drinking water.

H. A. SMITH
SAFETY, ENERGY & ENVIRONMENTAL AFFAIRS
MANUFACTURING DIVISION

HAS/is

EID079034

RJZ009054